

LONG LIFE, AND THE CAUSES THAT PREVENT IT.

BY ARTHUR RANSOME, M.D., M.A.,

Lecturer on Hygiene, Owens College; Examr. in Sanitary Science, Cambridge University.

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“TO die of old age is a death rare, extraordinary, and singular, and therefore by so much the less natural than other deaths. It is the last and extremest sort of dying; and the more remote from us, it is the less to be hoped for.” So said Montaigne, the witty French essayist of the sixteenth century, and he goes on to add that “when once forty years old we should consider our time of life as an age to which very few arrive.”* And in another essay, on the true use of philosophy, he says, “I will lay a wager that more have died under 35 years of age than above it.”† These remarks are, and no doubt were intended to be, sufficiently startling; and although no one would look for scientific accuracy in the pages of lively paradox from which they are taken, yet it must be remembered that the statements thus made may possibly be correct, and if so, whatever we may make of the fact, it would appear that the usual span of human life is really not more than half the length it is ordinarily supposed to be.

Now, strange to say, this is actually the fact, and considering the information at his command it is not a little remarkable how accurately Montaigne has stated the case. Even at the present day, when the period of human life is much longer than it was formerly, Montaigne would, in some countries, and in most large towns of any country, have won his bet, and in the France of three hundred years ago he would certainly have been much within the mark. In support of these assertions let me call your attention to the accompanying tables showing (1) the actual duration of life

* “Of Age.” Essays by Montaigne. Ed. 1866, p. 171.

† *Ibid.*, p. 62.

in different countries and in some parts of England, and (2) the improvement that has taken place in one country, Sweden:—

TABLE I.

Places.	Mean Age at Death.
England	29
France	34
Sweden	31
London	29
Liverpool	21
Surrey.....	34

TABLE II.

EXPECTATION OF LIFE IN SWEDEN AT DIFFERENT EPOCHS.			
Years.	Males.	Females.	
1755—75	33·8	36·6	
1776—95	34·7	37·5	
1816—40	37·5	43·5	
1841—55	41·3	45·6	

This result is in itself sufficiently surprising to those who approach this subject for the first time, and if we were to accept such a state of things as normal and not to be interfered with, as was doubtless intended by Montaigne,* we must regard "Long Life," the subject of our present discourse, as a matter rather of curiosity than a thing to be aimed at as possible or likely to be attained.

But there is some ambiguity attaching to the word *natural*, and this our author has fully taken advantage of. You will observe that Montaigne skilfully assumes that what ordinarily happens in nature is the only, or at least the most natural, event; that the duration of a man's life is the resultant of a multitude of forces—some of them favourable, others hostile; but the final outcome of their conflict must surely be what nature intended. And this is one sense in which undoubtedly the phrase may be rightly used. But there is another and more common meaning to be attached to the word. According to this the *natural* term of man's life means simply the length to which it should attain if it were not prematurely brought to a close by some malign or noxious influence.

And this is undoubtedly the right view of the matter when we are considering how long a man may be expected to live in a civilised community like our own. For where could we draw the line as to the play that has to be afforded to the *natural*

* He says, "Laissez faire un peu à la Nature, elle entend ses affaires mieux que nous."

forces? Pushed to its extreme length Montaigne's theory would literally not set the value of human life "at a pin's fee"—the natural duration of life could not be placed at the period of even a single day. Left to itself the new-born infant would infallibly die within a few hours; and without more protection from the elements than even instinct teaches animals to secure for their young, its existence could not long be continued. At every stage of life also there is needed constant care to guard against the action of natural forces, and thus both at the outset of existence and throughout the whole course of our life we are taught the duty of using means to preserve it, and the necessity of protecting it from the play of *natural* forces.

We cannot be wrong therefore in refusing to accept the ordinary as the natural duration of life, and we are left to try to discover what it would be under the most favourable circumstances, protected from the elements, guarded from accidents, and fostered by a natural and healthful mode of life; and to these conditions would have to be added two more, namely, that the individual should have been ushered into the world free from hereditary disease, and with a fair stock of vital power.

Now it will be readily understood that it is not easy to secure all these advantages in any one individual. We cannot examine a man's family history so as to learn the possible tendencies of his frame; we cannot gauge his vital power by muscular strength, by girth of waist, or width of shoulder, nor are we yet in a position to pronounce as to the most healthful modes of life. No such monster as a perfectly sane man, in this sense, has ever been seen, and if anyone were to try to attain to such perfection, it might well be doubted whether in order to live such a life he might not be losing something better than life itself, the true excellence of being.

We cannot then seek out a perfect being and take him as our type of a healthy man, and we must also abandon, as of little value, the speculations of those who try to fix an ideal age of 200 years to be attained by all the inhabitants of an ideal city of Hygeia. Fortunately the human body has been so framed by a beneficent Creator that it possesses wonderful powers of endurance under an infinite variety of conditions, and it will be found, I think, that the greater part of those who have attained long life have been men and women who have lived under the ordinary conditions of the society in which they moved. They have lived in healthy districts and much in the open air, have avoided excess of all kinds, and

have had good and sufficient nourishment, and they have above all imitated old Adam, in "As You Like It"—in their youth they

" Never did apply
Hot and rebellious liquors in (their) blood :
Nor did not with unbashful forehead woo
The means of weakness and debility ;
Therefore (their) age is as a lusty winter,
Frosty but kindly."

We must then seek for the natural standard of longevity amongst the records of human life.

In commencing our quest, however, we must set aside, as not within the present order of things, the accounts given to us of the ages of the patriarchs before the Flood. It is not for us to determine whether the great periods of life they are said to have attained to are to be accounted for by a different organisation from our own, or whether their years were counted, as some say with great probability, by lunar and not by terrestrial revolutions. All this must be left for others to decide. Nor, I fear, can we accept all the stories that have been handed down to us of great longevity attained in more recent times.* In this country there are some stock examples of longevity, that are often quoted in proof of the great age that might be attained by mankind if everything were propitious, but they are all without sufficient evidence to support them. Thus Henry Jenkins was said to have reached 169 years, on the strength of his own statement in 1670 that he remembered Henry VIII., and that he had conveyed a horse-load of arrows to the battle-field of Flodden in the year 1513. Thomas Parr again, who was spoken of as the "olde, olde, very olde manne," made affirmations that would go to prove that he was 152 years old when he died ; and the Countess of Desmond must have been indeed a wonderful being if it could be regarded as true that she cut a third set of teeth in her old age, and that she could in her 139th year walk four or five miles to the market town of Youghal. It is said, indeed, that she journeyed at this age all the way to London in order to seek redress from the king for some spoliation by English settlers. And even this did not kill her, for she survived another year, and then met her death by an accident such as might well

* Lejoncourt, without adducing proof, states that in the year 1700 there lived in Hungary a family named Rowir that was as long-lived as that of Abraham himself. Rowir himself was said to have survived 172 years. Madame Rowir to the age of 174, and one son was lost sight of at the age of 115.

excuse the poet Thomas Moore for calling her "a frisky old girl." Dr. Wynter, from whom this account is borrowed, quotes from the Earl of Leicester's Table Book that "Shee might have lived much longer had shee not mett with a kinde of violent death; for shee must needs climb a nutt-tree, to gather nutts, soe, falling down shee hurt her thigh, which brought on a fever, and that brought death."

It is almost pitiful to see the short work that is made of these tales by Mr. Thoms and Professor Owen. The ages that these old people have arrogated to themselves are to be accounted for either by a wish to create wonderment, and by the not impossible self-delusion that they have actually seen events that they have often heard described in boyhood or girlhood, or else, perhaps, by the tendency amongst those over seventy "to set the clock of their age too fast." Thus, as Fuller says, in his quaint language ("Holy Warre," chap. xix. of Supplement), "they often grow ten years in a twelvemonth, and are presently fourscore—yea, within a year or two after they climb up to one hundred."

In other cases again mistakes have arisen from their fathers and mothers bearing the same name as their grandparents, or, finally, the stories are mere myths, like the Yorkshire tale of the old man of eighty, who was discovered crying, because his father had beaten him for throwing stones at his grandfather.

Professor Owen, too, shows that even the well authenticated cases of aged persons cutting a fresh set of teeth are to be accounted for by the reappearance of old stumps that had previously been buried in the gum.

In his paper on "Longevity," in *Fraser's Magazine* for February, 1872, Professor Owen tells the following story in illustration of this fact. He had been visiting at a friend's house in Ireland, and had received with some incredulity an account of an aged parishioner of a clergyman guest who was then in her rooth year, in the act of cutting a third set of teeth. To convince him of the fact, his friend drove him over to her residence, and this was what he found. He says, "I never saw a more perfect picture of extreme old age. The smoke-dried, blear-eyed, many-wrinkled hag was crooning over the remains of the turf fire, her bare toes buried in the marginal ashes. I wondered that she had not long before died of mortification from a burn. She was as deaf as a post. The vicar, however, contrived to make her understand; and the old woman, turning her head to the light of the open door, pulled down a skinny lip and showed a lower jaw,

toothless save for one black stump, of which the crown had long before been broken away, probably after decay. My explanation was accepted by mine host, and at length, and somewhat unwillingly, by the vicar; but it was vehemently repudiated by the owner of the tooth. I was startled by the quickness of her inference from expressions of my face, or the manner of uttering words she could not hear, that I was rationalising away her cherished marvel. Glaring angrily at me, 'She knew, sure, she had had no tooth there for fifty years, and two years ago the new tooth had come up.' And this was very true. At fifty the gum had closed over the fang of the decayed and broken-off crown, the retained fang and its particular socket had been spared, and then the tooth stump had protruded through the subsiding gum." (P. 231.)

But, on the other hand, there are a very fair number of veritable centenarians—people who have at least reached their 100th year. Mr. Thoms himself gives instances of at least four such persons of ages varying from 100 to 104—and each year the Registrar General records the deaths of over 100 reputed centenarians.

In other countries similar records are to be found, and it is said though it must be confessed that the evidence on this point is unsatisfactory, that the number of persons dying at or over 100 is increasing. The question that next arises is whether we may accept these examples of centenarianism as types of what our length of days should be, and I think we may. When we consider the number of hostile forces arrayed against our lives it is no great marvel that so few attain to its extreme limit. As Shakspeare says—

"O Life, a breath thou art,
Servile to all the skiey influences."

Or again, as Sir Thomas Brown says, "Men that look no further than their outsides think health an appurtenance to life, and quarrel with their constitutions for being sick; but I that have examined the parts of man, and know upon what tender filaments that fabric hangs, do wonder that we are not always so; and, considering the 1,000 doors that lead to death, do thank my God that we can die but once." No doubt high authority has declared that "the days of our years are threescore years and ten," but this, as the context intimates, was because "our days are passed away in God's wrath," and because we are consumed by His anger for our sins; and in the same sacred volume we have the promise, "Thou shalt be no more thence an infant of days, nor an old man thou shalt have: for the child shall die an hundred years."

old." (Isaiah lxx., 20.) And the son of Sirach says, "The days of our life are at the most an hundred years." And we are not left without scientific data to guide us to a right conclusion. Physiologists have shown that there is a fixed term of life to every part of a man's body; that the teeth, the hair, the myriads of delicate cells that build up the frame, all have only a limited time to live. Like all things else—

"They have their day, and cease to be."

In his work on "Surgical Pathology," Sir James Paget traces the life history of an eyelash from its birth in the soft pulp, consisting of "round and plump nucleated cells," to its death, after it has dried up and lost its peculiar colour, and become white; and this death he shows to be "natural, spontaneous, independent of exercise, or of any mechanical external force, the natural termination of a certain period of life." ("Surgical Pathology," 2nd ed., 1863, p. 7.) And what is true of its several parts is true of the whole body, and medical men have arrived at a fair approximation to the time that it ought to last.

It has been shown—first by Buffon, many years ago, and more recently by M. Flourens—that there is a certain definite time for the body to arrive at maturity, and this time can in most animals be fixed by noting the epoch at which the bones become consolidated, and from these data the natural duration of life is found to be about five times the period occupied in true growth. This is shown by observing that in the dog, "ossification" as it is called, or bone-making, is completed in about two years, and the dog ought therefore to live, and usually does live, if its life is not cut short by drowning, shooting, or prussic acid, &c., to the age of ten years. The corresponding times of ossification for a cat are said to be eighteen months; for the ox and lion, four years; for the horse five and for the camel eight years; and if these numbers are multiplied by five, it will give the normal period of life of these animals. So likewise in man, the ends of the bones are usually found united to the shaft at the age of twenty, and hence M. Flourens and other physiologists have concluded that he ought to live to 100. It is somewhat interesting also to notice that lawyers, who, though they do not deal much in physical science, yet represent the general opinion of mankind, have long ago fixed 100 years as the limit of life—no man being counted as dead, without sufficient evidence, until 100 years have elapsed from the date of his birth. I think, then, that, fortified by all this evidence, we may

reasonably conclude that when death takes place before the attainment of 100 years it is from some cause or other premature, and that the Bible promise, that this age, in some happier time than the present, shall be reached by every child that is born, is consonant with sound physiological teaching. But let us take even the more usual anticipations of mankind, and lower the standard to between seventy and eighty years of life, and then let us glance for a few moments at the two pictures set before us—on the one hand of life to a good old age, and on the other of an existence that only reaches on an average to about one-third or one-half its natural length.

Now I will grant at once that long life is not worth having unless it is accompanied by health. There are not many who would care to outlive the possession of a satisfactory extent of their faculties. Few would voluntarily play the part of "lean and slippered pantaloons," or worst of all, endure the "second childishness and mere oblivion, sans teeth, sans eyes, sans taste, sans everything."

There is probably at all ages a natural clinging to even the last few strands of a parting life, but none of us would care to anticipate the time when "the grasshopper shall be a burden," and when the evil days come in which we shall say, "I have no pleasure in them."

But, in estimating the desirability of long life, we must not lose sight of the fact that, as a general rule, longevity also means strength of constitution, both mental and bodily.

It is remarkable that most of the instances of longevity have also been cases of retention of the bodily powers and faculties up to a very late period. Numerous examples might be given of this fact. The great painters Michael Angelo and Titian both lived to the age of 96, and died almost with their brushes in their hands; Lords Eldon and Lyndhurst were able to work up to the last days of their long lives of 90 years; Sophocles wrote a tragedy at 73; Wesley was vigorous up to 88; and our English statesmen have often shown great mental power and vigour up to very advanced periods of life.

Few persons can doubt the advantage to a community of long life amongst its members; and, to the individual, old age, though it may have many sorrows, yet has many compensations. It is not only Cicero who has discovered that "though the old cannot do what the young can, yet they can do much greater and better things." "Great actions are performed not merely by exertions

of strength or speed, or by quick movements of the body, but also by talent, by authority, and by judgment, and of these faculties old age is so far from being deprived that they usually grow the stronger with advancing years." It is perhaps for these reasons that so much stress is laid in the Bible upon the blessing of a long and healthy life. In the first commandment with promise, the reward placed before us is "that thy days may be long in the land;" and no one can read the Old Testament without being struck by the numerous promises of length of days to those who keep God's laws. And may we not assume that these are both His moral and physical laws? Thus—

"Thou shalt come to thy grave in a full age, like as a shock of corn cometh in in his season." (Job v., 26.)

"Hear, O my son, and receive my sayings; and the years of thy life shall be many." (Prov. iv., 10.)

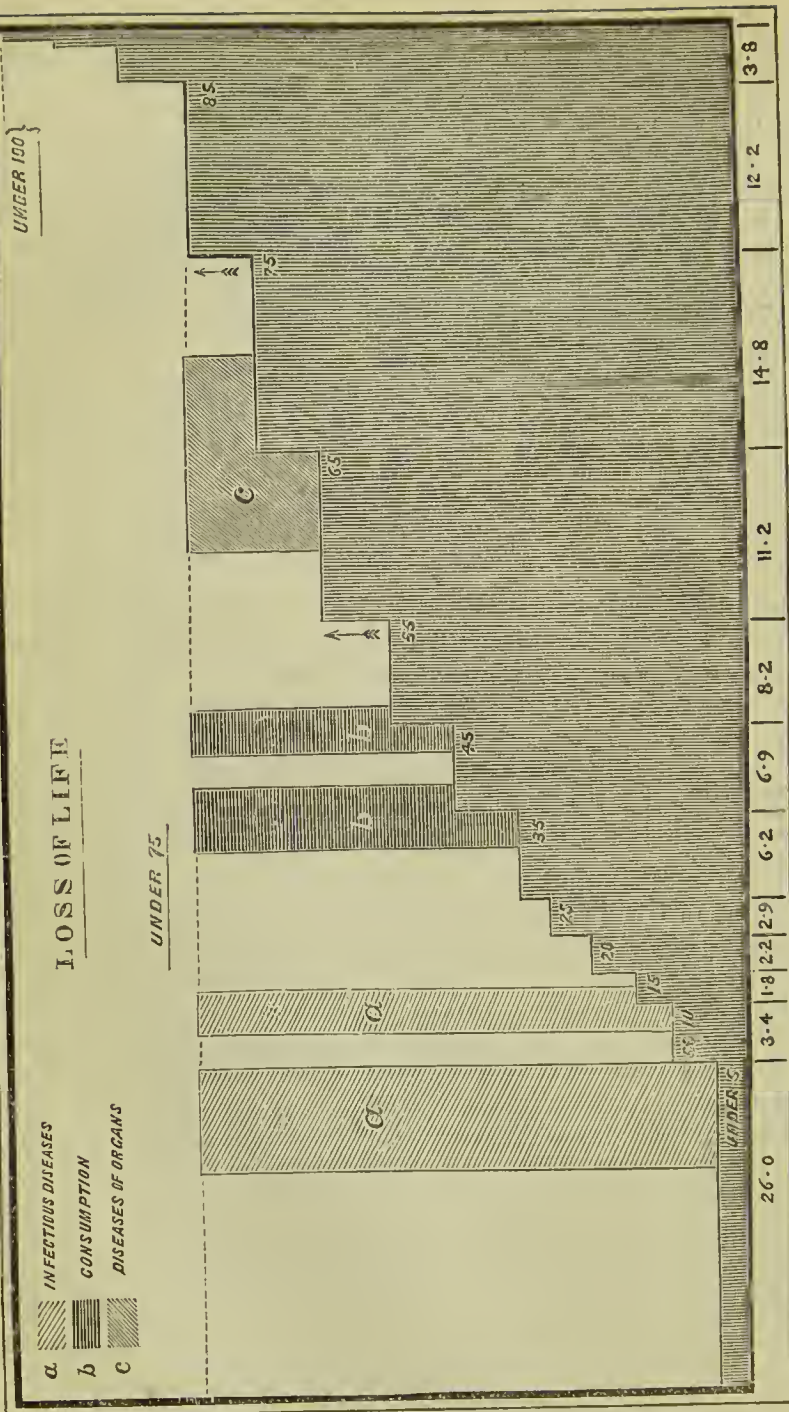
"For length of days, and long life, and peace, shall they add to thee." (Prov. iii., 2.)

"Length of days is in her (wisdom's) right hand." (Prov. iii., 16.)

But what a miserable contrast to these promised blessings is afforded by a glance at the actual course of human life as shown by the Registrar-General's returns each year.

As I have already shown, the average age at death in all England, including its healthiest districts, is only 29, and in our large towns even this small allowance is materially reduced, the length of life in Liverpool being only 21 years, and in Manchester it is very little more. The weight with which this fearful death-toll now presses upon our English populations will be more clearly seen, and its causes better shown, if we try to learn how it is distributed amongst them. I have endeavoured to do this, without dragging you through a maze of figures, by throwing the proportion of deaths at each age into the form of a diagram.* If we suppose that 1,000,000 children are born in any given year, and this figure would be somewhat under the number born in Great Britain alone, then the number of these who fail to attain to the age of five years would be shown by the narrow line at the bottom of the chart; for out of 1,000,000 children born about 260,000 die before they have completed their fifth year of life; 150,000 of them before they have reached one year of age. After this period the mortality is shown at each five years up to the age of 25, and in these periods you find that the mortality has become very much less, for it is

* See page 12.



The breadth of each step of this diagram denotes the percentage of deaths that occur under each age; their height fixes the limit of age under which the deaths occur. The several columns that rise at three periods of life are intended to show the number of years of life wasted at each period by the three several causes—(a) zymotic disease, (b) consumption, (c) diseases of organs.

represented by a series of short steps of from 18,000 to 34,000, each showing how few comparatively drop out of existence at these healthiest years of life. After this, ten-year spaces are taken, and now we see that the mortality gradually becomes greater until the age of 65 is reached, and by this time there are so few left to die that the numbers dying at each decade of life again get smaller, until at last we reach between 95 and 100, the thin small stream of life represented by the narrow vertical line showing that 2,300 persons attained this age, 223 of the 1,000,000 reaching 100. You see at once from this diagram the full explanation of the discrepancy that exists between the truly natural and the average duration of life actually attained. Very few indeed reach the true limit of age ; all the rest die prematurely. The number of years of life thus lost is shown by the space enclosed in black lines in the upper part of the chart, and as this includes more than half—about six-tenths of the whole, in fact—we see why the average duration of life is comparatively so short.

It is worth while to pause for a few moments here to consider what all this means. And first let us notice the vastness of the sacrifice that is thus made to death. It is difficult to realise all that is here represented by a few figures and some roughly drawn lines. As Mrs. Browning says—

“ We talk by aggregates,
And think by systems, and being used to face
Our evils in statistics, are inclined
To cap them with unreal remedies,
Drawn out in haste on the other side the slate.”

But each of the units that have gone to swell the many thousands of the total represents a time of pain and grief to the individual—of sorrow and mourning to the survivors. Every preventable death is an unnecessary pang added to the portion of suffering humanity.

Even judged by the low standard of money value, the loss to the nation is enormous ; the unproductive expenditure upon these many lives is wasted ; and if we were to take, as some have done, the value of a human life in England to be represented by the value of a slave to his owner, the actual money loss to the country in each generation would be represented by many tens of millions of pounds. What makes this waste of life so sad is that a large part of it is *preventable*. We are apt to think with Montaigne that it is inevitable, and that we should not try to interfere with the course of nature. There are some even amongst sanitarians

who would say, with reference to the mortality amongst children, that all this grievous slaughter of the innocents is *natural*, and should not be interfered with; that it is the means by which the race as a whole is improved, and that no attempt should be made to prevent it, for fear of the over-population that must ensue unless it were permitted to continue. This language is used by those who ought to know better, and I have no words at my command strong enough to characterise it as it deserves.

There are, indeed, never wanting those who would counsel a "masterly inactivity" in almost every contingency that can arise. Even in the most awful moments recorded in history there have been found men who could look calmly on while the innocent have been suffering—men who have held back assistance with the phrase, "Let be, let us see what will happen if things are left alone." As Carlyle says, "To button your pockets and stand still, saying, '*Laissez faire, laissez passer*,' is no complex recipe. . . . And to believe practically that the poor and luckless are here only as a nuisance, to be abraded and abated and in some permissible manner to be made away with, swept away out of sight." This, at least, is not an amiable faith, and may be denounced at all fit times as "false, heretical, and damnable," if ever aught was.

I have myself elsewhere protested strongly against this doctrine, and have shown not only that there is no danger but every advantage to our race to be expected from checking the causes of the excessive mortality that prevails now amongst us, and I trust that before I have done you will see cause to think with me. For the present, I will only say that whatever other restrictions may need to be imposed upon over-population it cannot be right now to stand aside and say, "Let these people die; there are too many of them; or there will be too many of them else." Every child born into the world has a right to live, and anyone who would withhold from it the means of life, or who would refrain from helping with all his power to fight against the known enemies to its health, is surely to be reckoned as partaking in the guilt of its death.

We come next to the practical questions, Can all this loss of life be prevented? If not, how much of it can? First, may we anticipate a time when "there shall be no more thence an infant of days, nor an old man that has not filled his days: for the child shall die an hundred years old." (Isaiah lxx., 20.) I cannot but believe that a time will come when this prophecy will have its

literal fulfilment, but if the question be asked of some time near at hand, we must answer unhesitatingly in the negative. Sanitarians have sometimes been accused of exaggeration in their estimate of the number of deaths that are preventable, but they have been accused without justice. In one sense, all deaths happening under the age of at least threescore years and ten might be regarded as preventable, but the masters of sanitary science have never thus placed the question. They have indeed reckoned that 120,000 preventable deaths occur each year in England, or about one-fourth of the total deaths, but this calculation has not been made upon any theoretical grounds, but simply upon the actual loss of life in the least unhealthy districts and towns of England as compared with the mortality in large towns and unhealthy districts. I have here a diagram showing the extreme variations of some of the fatal diseases in different parts of the country, and you will see how great is the difference between them; and this difference is not in consequence of any greater advantages in the way of affluence, or freedom from accident or protection from the elements in the more favoured districts. It simply arises from what may be called better sanitary conditions, such as better air, better water, greater cleanliness, less overcrowding, less drunkenness, and so on. The 120,000 lives lost uselessly each year are simply sacrificed to want of care and want of knowledge, and are due for the most part to gross departures from the laws of health.

But if this mortality is preventable how is it to be prevented? The answer is, shortly, by removing the chief causes of these deaths. This means will be better understood, however, if we go a little more deeply into the subject; but in order to spare you unnecessary trouble I shall only take the broadest view possible of the subject. Neglecting all minor causes, we find that there are at three chief periods of life three great groups of diseases which seem in some way to be related to the several ages. I have represented these groups on the diagram by three masses of ruled lines that extend to the ordinary limit of age, and in this way I have hoped to give you some idea of the loss of years of life that each class of disease causes. The diseases in question are—(1) infectious or zymotic diseases, as they are called, that weigh with especial stress upon the ages under ten; (2) the tubercular or consumptive diseases that destroy many lives between 25 and 35; and (3) the diseases of the several chief organs of the body that carry off the majority of those who attain to the age of 55. I by no means

intend to convey the notion that these complaints are exclusively prevalent at these several ages ; but seeing that in this brief review we have to deal only with the great masses of preventable deaths, I have for the time left out of sight the hundreds and thousands of deaths that are occasioned by them at the other ages, and have only taken account of the tens and hundreds of thousands that are their victims at these ages. I must still further confess that both the second group of tubercular diseases and the third group of diseases of organs also carry off enormous numbers in infancy, but for our immediate purpose, and for the sake of clearness of description, I have refrained from representing them upon the chart.

First as to *infectious complaints*. The fearful havoc that is wrought by these diseases is well shown by two other tables which were given in a previous lecture for the Association, entitled "Seeds of Disease." From these tables we see that in the space of ten years they carried off in England and Wales nearly five million people, and in Manchester and Salford alone the mortality reaches a total of 113,000 deaths. This group of complaints included cholera, smallpox, scarlet fever, typhus and typhoid fevers, measles and whooping-cough, diphtheria, and the like ; and it is not a little striking to notice that the comparatively simple diseases, such as whooping-cough and measles, that seldom kill when sufficient care is taken of those who suffer from them, carry off the enormous number of 28,000—nearly as many as of the more dreaded disease, scarlet fever (30,000), and five times more than such complaints as cholera and smallpox, that cause so much alarm when they appear in our midst. The reason for this terror is, however, well shown by the other diagrams I have also brought with me to show the mode in which these complaints descend upon a nation, and carry off in one year more than they have done in five or six non-epidemic years. It is their sudden invasion and rapid spread that strikes fear into men's hearts. Here, for instance, is a representation of the great plagues of London in 1625 and 1626, and here again is seen the manner in which zymotic diseases carried off in the Crimean war more than ten times the number that were killed in battle. (Diagrams.)

The second great devastator of our race is *Consumption*, and there is hardly any need to look at the diagram, for everyone knows in what quarter to look for its ravages. Although it spares no age, and carries off no insignificant number (over 30,000), even of children under five, yet it is essentially the disease of the prime of life. It

has been found that about one-fourth of the whole number of premature deaths (about 130,000) are caused by consumptive diseases, and of these, as we see from the diagram, a very large proportion (nearly 70,000) takes place between the ages of 25 and 45. It is the peculiarity also of this disease not only thus to take the best of the ages, the bread-winners and the mainstays of families, but it usually picks out the flower of the flock in every respect—the most lovely, the most docile, the most intelligent, and the wittiest—in a word, the most gifted of a family. Few can have failed to notice how constantly the young amongst those who have been thought worthy of biographical fame have succumbed to the onset of this fell malady, and yet this is a preventable disease.

The third group of fatal maladies is one of a much more heterogeneous nature. It comprises a list of diseases of the heart and brain, liver and kidneys, and as people must die of some complaint at last, it might be supposed somewhat hazardous to call attention to these complaints as belonging to some extent to the preventable class. All I would do, however, in this regard is to point out that many of these deaths are caused by the inability of certain organs of the body to bear the strain thrown upon them; and that as these deaths are premature it shows that some influence has been at work to undermine the constitution and favour the fatal issue.

These are three great clouds of disease that overshadow the people of England, and that bring so many of them to premature graves in the course of a year. And I would place over against them, and in some sort of relationship with them as causes, three equally pernicious groups of influences—three sets of causes of the causes of death—and these are—(1) filth, (2) confined air, and (3) intemperance. To the first I venture to ascribe a large part of the preventable infant mortality, to the second many cases of consumption, and to the third much of the premature decay of the different organs of the body.

In saying this, however, I do not intend to convey the meaning that these influences are exclusive in their action, that the infectious and other diseases of infancy are simply born of uncleanness, nor that consumption is due to confined air alone, nor yet that drinking is the sole cause of the mortality of middle age. But as we are endeavouring now to take a sort of panoramic view of the subject, I select these influences as the most powerful amongst the many others that are concerned in the result. More-

over, it will be found, I think, that each of them has something to do with all the forms of fatal disorder : that filth intensifies the action of confined air, and weakens the powers of life, so that consumption is more easily engendered ; that foul air is a common cause of infant mortality and of general ill-health ; and that intemperance extends its baleful influence over many more than those who are actually given to over-indulgence in drink. Still a brief glance at each of these morbid powers will show that their favourite hunting-grounds are within the regions I have assigned to them on the chart.

First, with regard to filth, and what I mean by this degrading epithet. Probably four-fifths of the subjects dealt with by sanitary science have to do with impurity or filth of some kind or description. It has been well said by Dr. Lyon Playfair that a large part of its teaching might be summed up in the dictum, "Wash and be clean," or still more briefly in the one word, *cleanliness*. If we could insure perfect purity of mind and body, of food and drink, of air, clothing, and dwelling, there would indeed be very little left for sanitarians to do ; but it is not in this extended sense that I now use the word *Filth*. I wish rather to restrict the term within the limits recognised by Mr. Simon in his admirable report to the Privy Council on the subject of "Filth Diseases and their Prevention," and I would speak now only of uncleanness in its grosser degrees, "such, for instance, as any average man or woman should be disgusted at ; such as eminently the presence of putrescent refuse matter, solid and fluid, causing nuisance by its effluvia and soakage." The word is used distinctively in that sense which suggests "subject matter for sewers and scavenging." Now no one can doubt that there exists around us, especially in our large towns, great quantities of material of this description. In many cases, no doubt, it is hidden away out of sight, but very often, amongst the homes of the poor, especially, it exists, if not actually in the dwelling, at only a foot's pace from the door, and in the mansions of the rich frequently the case is still worse, for the concentrated fumes arising from its decomposition are brought by tubes into close proximity with bedrooms, or else, owing to wrong construction of drains, to faulty joints in pipes, or to some other cause, this poisonous vapour passes directly into the air of the living rooms. Thus no class is exempt from its influence. Many of the highest personages in the land know to their cost the fatal effects of breathing the emanations arising from filth ; and the loss of life amongst the poor from the same cause is enormous.

The operation of this mortific agent is indeed manifold, and spreads over the whole field of disease ; but it is especially as a cause of infant mortality, and as a fosterer of infectious disease, that its influence is most felt. Young children are peculiarly susceptible both to the ordinary depressing effects of decomposing matter and to the epidemic diseases that spread most rapidly wherever noxious matter of this description is abundant. In round numbers, out of 1,000,000 children born, about 50,000 die under ten of various diseases of the brain, 25,000 of various forms of scrofula, and about the same number of diarrhoea and dysentery. Out of the aggregate of 100,000 deaths thus caused a very large number have probably arisen from either slow or rapid forms of poisoning of the blood, and might have been avoided if thorough cleansing and scavenging away of filth had been practised. Convulsions are very commonly produced by filth and bad ventilation. In the island of St. Kilda, for instance, where the floors of the cottages are simply formed of the dung of animals, in these abodes of filth nine out of every ten children born died within the fortnight of convulsions. Doubtless many infantile deaths are caused by exposure to cold and wrong feeding ; but making every allowance for these a very large proportion of the mortality is really due to filth.

But in some instances the poison that arises from putrid filth is more definite and specific in its character. It has been shown by recent researches that in every case of putrefaction of animal matter minute organisms necessarily accompany the process ; but in many cases these organisms, instead of simply assisting ordinary decay, have the power of causing the most deadly of all classes of disease, the infectious or so-called zymotic group of disorders, especially smallpox, typhoid and relapsing fevers, and diphtheria. The exact mode of origin and of action of the beings that are present in these complaints is still not thoroughly understood. There is still much controversy going on in the medical world respecting these "germs of disease," some believing with Dr. Murchison that they may arise spontaneously from the filth that surrounds them, and others, as I myself think with better grounds, only allow that putrefying animal matter is their foster parent, and trace their source to some previous case of the same disease. With regard to their mode of action also—whilst some regard them as essential agents in the febrile process, others believe that they are themselves innocent, but are the constant attendants upon other still more subtle and powerful poisons. It is, however, of com-

paratively little importance for our purpose which of these theories is correct. In any case it is certain that they only grow and flourish where insanitary conditions exist; and in the case of cholera, typhoid fever, and some forms of dysentery, the complaint is only produced when there has been direct absorption of poison from actual excrementitious matter.

Speaking of typhoid fever, and the same is true of cholera, Mr Simon says, "It is difficult to conceive in regard to any causation of disease in a civilised community any physical picture more loathsome than that which is here suggested; that apparently of all the diseases which are attributable to filth, this, as an administrative scandal, may be proclaimed as the very type and quintessence; that often, in the most glaring way, it apparently has an invariable source in that which of filth is the filthiest; that apparently its infection runs its course, as with successive inoculations from man to man, by instrumentality of the molecules of excrement which man's filthiness lets mingle in his air and food and drink." (P. 14.) The poisons of smallpox, scarlet fever, diphtheria, measles, and whooping-cough are less evidently connected with uncleanly surroundings, but it has been found over and over again that even these disorders are more common, or at least more fatal, where bad drainage or bad scavenging are permitted to exist. The best and most powerful disinfectant is *Cleanliness*.

Foul Air.—The next morbid influence that we have to deal with is foul, or rather confined, air—air contaminated with the product emanating from the lungs and skin of human beings. I wish to place this agent in relation to the fearful amount of consumption that we have seen carried off so many thousands of the youth and prime of life in England. I have already dealt with this subject in one of the series of Health Lectures under the title of "Foul Air and Lung Disease," and there is consequently the less need for me to dwell long upon it now. It is, in truth, a large subject, and needs more than one lecture to display it in all its serious importance. I must, therefore, simply ask you to take it for granted that I am justified in referring a large part of consumptive disease in this country to this simple cause. I must say that I entirely agree with that eminent sanitarian, Mr. Michael, in saying that polluted air is of even greater consequence to the public health than polluted water. The air of rooms in which human beings live, unless it is constantly renewed at the enormous rate of about 10,000 gallons per head per hour, contains a minute but poisonous dose of

putrefying organic matter, and if this substance is breathed again into our lungs it is apt to cause, and in very many cases does cause, such lowering of the vital powers, such irritation of certain tissues, in a word, such *poisoning* of the system, as ends in gradual destruction of the lungs—in that painful and wasting disease that commonly goes by the name of consumption or decline. There are many other causes that combine to help forward this result, such as hereditary tendency, insufficient nourishment, exposure to cold, and so on, but very few cases are ever produced by these alone—by far the vast majority of consumptives are simply poisoned by noxious breath.

It is this fact that accounts for the excessive prevalence of consumption in large towns, and the comparative immunity of country places, especially of places like the Hebrides and Orkney and Shetland Isles, where the strong breezes from the Atlantic and northern seas play freely through the rude dwellings of the poor. It explains the distribution of the disease amongst males and females, only attacking those who have to keep the house, or who have to go to work in confined workshops ; and above all, it points to the cause of the fearful mortality from consumption that has, for many years past, taken place amongst our brave soldiers and seamen in all climates.

It is at first glance most marvellous, as well as most sad, that men picked for their stalwart frames and good health out of the best of the community should yet, at one time, as soon as they entered the service of Her Majesty, have died of lung disease at twice the rate of the poorest and most neglected of the population. Notwithstanding all the care that was lavished upon them, the good food, the warm clothing, the regular living, and in spite of careful tendance during sickness, these men contracted consumption, and died in their early manhood like rotten sheep. Moreover, this took place not alone in England, but wherever they went on the face of the globe. In the healthiest regions as well as the unhealthiest—in the very places in fact to which consumptives are now sent to winter in—the same fate overtook them, they began to cough, to waste, and finally they died consumptive.

The simple explanation of all this sickness was at last discovered to be that wherever these men went they carried with them the same noxious atmosphere. At nearly every station, except India (where also there was less disease), the barracks were constructed upon the same pernicious principle, with crowded and insufficiently ventilated dormitories and living rooms. It was not surprising then

that the same fate overtook them all. Had inquests been held upon the cause of each of these deaths the same verdict might in most have been returned, namely, "Poisoned with bad air."

Great improvements have happily taken place of late years in barrack construction, and the lessened mortality that has ensued affords still further proof of the connection between consumption and foul air.

But I must point out that the same cause is still constantly at work in all our crowded populations, and each year great numbers are being sacrificed by it. A great army of recruits is thus in fact yearly sent to the regions of Death—for the contingent thus furnished consists of more than 100,000 persons—a number, I believe, equal to half the regular standing British army.

The last of the destroying powers that I shall mention to-night is *Intemperance*, and though perhaps more difficult to trace in its effects, it is of even more importance on social and moral grounds than the two which we have already passed in review. It has power to destroy happiness as well as health, to debase mind as well as body, and to bring destruction upon many innocent persons who themselves never taste a drop of any intoxicating liquor. It may readily be conceded that it is not possible to pick out of the Registrar-General's tables all the deaths that are directly or indirectly due to intemperance; and even the records of certain total-abstinence life assurance societies, although their results are unfavourable even to moderate drinkers, give only the effects of drinking upon the drinkers themselves. If we are to estimate the influence of alcohol on mortality, something more is needed than this, for we must know also how habits of drinking affect households and communities as well as individuals. There is a means by which some approximation to this result may be obtained, and this is—first to note the death-rate in certain districts where the ordinary amount of drinking is going on, and then to take advantage of some period of time when, in the same districts, either (*a*) no alcohol is taken at all, or (*b*) very much less is taken than at ordinary times. Now, the first of these cases has occurred in certain counties in Wales, notably in Caernarvonshire, in the island of Anglesea, and Flintshire. In these large districts rather more than thirty years ago a wide-spread movement in favour of total abstinence took place, and prevailed for several years to such an extent that most of the public-houses were closed, nearly all the inhabitants abjuring the use of alcohol.

Again, the effects of merely a diminution in drinking habits

are shown (1) by noticing the lessened mortality of places where this diminution has been the consequence of legislation—as in Edinburgh during the enforcement of the Forbes-Mackenzie Act; (2) by observing the constant decrease of the death-rate in districts that are under the pressure of some temporary monetary depression, especially when people have been fed by charity, but have been too poor to purchase drink. This condition of things, notwithstanding the hardships that have otherwise been endured, has invariably brought about an improvement in the health of the community, an improvement marked by a lowering of the death-rate by several deaths in the thousand. From the data thus indicated, I have endeavoured to calculate the total mortality due to the use and abuse of alcohol, and I have come to the conclusion that we shall probably be much under the mark in estimating its fatal influence at 50,000 deaths per annum.

I am glad to find that my view of this subject is corroborated by independent researches made by other methods by Dr. Morton and Dr. Kerr—a still larger estimate being made by these observers. This calculation includes, of course, much infant mortality, as well as the early decadence of strength shown by the premature deaths in the latter part of the chart. Moreover, I do not wish to ignore the ill effects of the hurry and bustle and the high pressure under which men live at the present day. These also have much to answer for in the premature aging of the vital organs, especially of those centres of life the heart and the brain; but I fear that one very serious consequence of this unrest is a habit of taking frequently small quantities of alcoholic liquor, and the result is early degeneration of tissues, ill-health, and finally premature decease. The effects upon health of drinking habits are well shown in the table drawn up by Mr. Neison, showing the chance of living possessed at different ages by the temperate and intemperate man respectively.

In intemperate persons the mortality at 21-30 years of age is five times that of the temperate; from 30-40 it is four times as great. It becomes gradually less.

A Temperate person's chance of living is		An Intemperate person's chance of living is	
At 20.....	44·2 years.	At 20.....	15·6 years.
„ 30.....	36·5 „	„ 30.....	13·8 „
„ 40.....	28·8 „	„ 40.....	11·6 „
„ 50.....	21·2 „	„ 50.....	10·8 „
„ 60.....	14·2 „	„ 60.....	8·9 „

We have now passed in review some of the causes that prevent long life, and, in conclusion, I venture to ask all who are here to-night to join with our Association in strenuous battle against the enemies of human life, whose power for evil I have now laid bare before you. The means of combatting these several morbid forces you will find fully detailed in the various publications of the Association, and I would beg you attentively to study them, and to join earnestly in our crusade—our crusade under the standard of humanity against “the foes that are of a man’s own household.”

It is to no unworthy object that I ask you to devote your energies. It is to save from death no fewer than 120,000 persons every year—more than a million in a decade—and at the same time to lessen the mass of suffering and grief that now weigh so heavily upon the nation. I do not think that I shall appeal in vain. Fortunately there is a natural instinct in mankind for the saving of life. Witness the heroic deeds of lifeboat crews, or of the forlorn-hope gangs in coalpit accidents, and the fact that we almost refuse the title of human being to anyone who neglects, even at the risk of his own life, to fly to the succour of a fellow-creature. The term humanity necessarily implies a zeal for protecting God’s creatures from pain and death. And let no one think that he is not doing God service, as well as man, by this work. Medical men are sometimes accused of caring more for the welfare of the body than for the interests of the soul, but I would ask whether there is not a danger of even good men falling into the other extreme—whether we may not, in undervaluing this life, be guilty of the sin of despising one of the good gifts of God? And there is this further possibility, that in neglecting the unwritten but natural laws of the Creator we may fall into a practical atheism, at least as perilous as the honest scepticism of the man of science.